STATION BULLETIN 390 MAY 1941

# Cost, Efficiency, and Management of Dairy Cattle Pastures, Coast Region, Oregon

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## FOREWORD

Good pastures provide one of the most important and most economical sources of livestock feed in this state. The relative carrying capacities and costs of various types of pastures in Oregon are subjects receiving increased attention.

This bulletin is the first in a series of three publications that report findings on the costs, efficiency, and management of pastures in three important areas of the state.

This first bulletin covers pastures in the Coast Region; the second will apply to Eastern Oregon; and the third will discuss pastures in the Willamette Valley.

Wm A Schoenfeld

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## SUMMARY

This publication on the subject of pasture costs and grazing values, one of three which together cover most sections of Oregon where farm pastures are of major economic importance, concerns itself with bottom-land dairy-cattle pastures in the Coast Region of Oregon. The study was made by the survey method, covers the 1934 and 1935 pasture seasons, and includes 138 pasture records obtained from 88 coast dairy farms.

### Pasture Types Studied

The pastures included were classified into four pasture types on the basis of predominating forage plants. These types are mixed grass, bent grass, clover and rye grass, and Reed canary grass.

### Grazing Value

The grazing values of the pasture types studied were:

| | *Animal unit (cow) days of grazing produced per acre* | *Length of pasture season* | *Acres utilized to carry one animal unit for the season* |
|---|---|---|---|
| | *Number* | *Days* | *Number* |
| Mixed grass | 119 | 238 | 2.0 |
| Bent grass | 138 | 224 | 1.6 |
| Clover and rye grass | 200 | 239 | 1.2 |
| Reed canary grass | 251 | 209 | .8 |

### Maintenance Cost

The major items of pasture cost are for the use of the land (5 per cent interest on the estimated value), taxes, fence costs, fertilization, cultivation, and weeding. The first two are the largest. Interest accounts for approximately 60 per cent and taxes 30 per cent of all costs. The total average maintenance costs for the four pasture types studied were:

| | *Per acre* | *Per animal unit day of grazing* | *Per cow per season* |
|---|---|---|---|
| Mixed grass | $ 8.76 | 7.4¢ | $17.50 |
| Bent grass | 11.06 | 8.0 | 18.00 |
| Clover and rye grass | 14.05 | 7.0 | 17.00 |
| Reed canary grass | 14.29 | 5.7 | 12.00 |

### Land Values and Taxes

The operators were asked to estimate the value of their pasture lands based upon the asking price of similar land in the vicinity. Assessed values and taxes were obtained from the county assessor's office. The variation of all three items between pastures depended more upon the area in which they were located than upon pasture type or productivity. Average land values, assessed values, and taxes for the pastures studied were:

| | *Operators' estimate of value of land per acre* | *Assessed value of the land per acre* | *Taxes per acre* |
|---|---|---|---|
| Mixed grass | $108.20 | $ 50.00 | $2.00 |
| Bent grass | 126.20 | 66.00 | 3.59 |
| Clover and rye grass | 188.60 | 85.00 | 3.46 |
| Reed canary grass | 160.60 | 128.65 | 4.11 |

# Cost, Efficiency, and Management of Dairy Cattle Pastures, Coast Region, Oregon*

By

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## INTRODUCTION

FROM California north to the Columbia River lies a strip of land between the Coast Range of mountains and the Pacific Ocean. On the bottom lands of the numerous streams and rivers of this region a flourishing dairy enterprise has developed based primarily upon mild weather and luxuriant pasturage. Notable among the areas making up this region are the Coos and Coquille River valleys, the Tillamook Country, and the Lower Columbia River Area in Columbia and Clatsop Counties.

The census of 1935 records a total of 46,255 cows milked during 1934 in the six counties of Columbia, Clatsop, Tillamook, Lincoln, Coos, and Curry, which make up the Coast Region. The large majority of these cows depend for their feed primarily upon the bottom land pastures that are the subject of this study. At the time of the 1935 census pastures occupied about 80 per cent of the agricultural land of the region.

**Purposes of the study.** It was the purpose of this study to:

(1) Determine the grazing value of all the important pasture types used for the grazing of dairy cattle.
(2) Determine the cost of producing this pasturage.
(3) Examine the relative value of the different pasture types and to point out their position in the cropping and pasture program of dairy farms.

**Scope and methods of making the study.** During the two years of this study, 1934 and 1935, 138 survey records were obtained covering the stocking and costs of operation on dairy cattle pastures in the Oregon Coastal Region. The data obtained cover 5,249 acres and 822,770 days of grazing by some 5,000 head of dairy cattle or their equivalent of other stock. The general location and distribution of the farms included in this study are shown in Figure 1.

* *Acknowledgments:* The author expresses his sincere appreciation to those who have aided in the preparation of this bulletin. Especial credit and thanks are due: (1) the farmers from whom the basic information was obtained; (2) H. E. Selby, formerly head of the Department of Farm Management, who was instrumental in setting up this study and who directed the first year's field operations; (3) Oran M. Nelson, professor of Animal Husbandry, for his substantial aid in the collection of the data and for counsel in its analysis; (4) E. R. Jackman, extension specialist in Farm Crops, and Harry A. Schoth, Agronomist, United States Department of Agriculture, for subject-matter information freely given; (5) Howard G. Smith, Arnold N. Bodtker, and Leland Fryer for their services in collecting the field data; (6) the county agricultural agents of the counties included in this study; and (7) D. Curtis Mumford, head of the Department of Farm Management, and E. L. Potter, chief of the Division of Agricultural Economics, for aid in the preparation of the text.

**General description of the region.** Coast dairy farms are largely found on the fertile alluvial soils of streams or rivers that empty into the Pacific. These soils are generally well supplied with moisture and may lack drainage. An annual period of two or three months occurs, however, when the precipitation drops to low levels (Figure 2). During this almost drouth period unirrigated pastures, except those affected by tides that back up the rivers and so flood the surrounding area, tend to become dormant and the forage sparse. A condition thus arises where plant life annually suffers from lack of moisture in a region having a normal precipitation rate of from 60 to 100 inches a year.

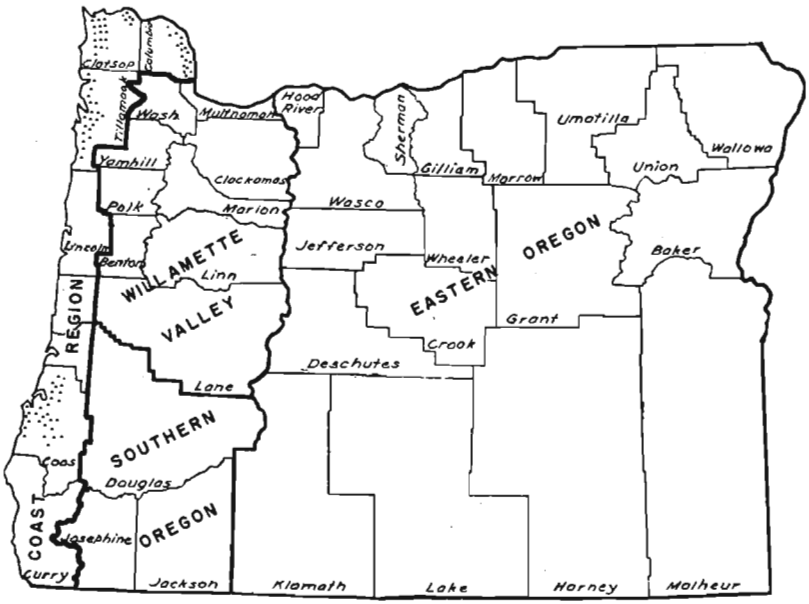


Figure 1. Location of cooperating farms, Pasture Study, Coast Region, Oregon, 1934 and 1935.

Another outstanding climatic feature of this area is the uniform mildness of the temperature. In this regard the weather bureau reports: "The narrow belt west of the Coast Range has a very equitable climate. In this belt there is little freezing weather, and on the rare occasions when snow falls it seldom remains on the ground over a few hours. The mean minimum in midwinter is mostly between 36° and 40°, and only a few places in this strip have experienced zero weather. The mean maximum temperature for July ranges between 65° and 70°, and only occasionally does the temperature reach 90°, though a number of places have had a day or two with a maxima of 100°."*

* Climatic Summary of the United States, United States Department of Agriculture, Weather Bureau, Section 3—Western Oregon. Data from establishment of stations to 1930, inclusive.

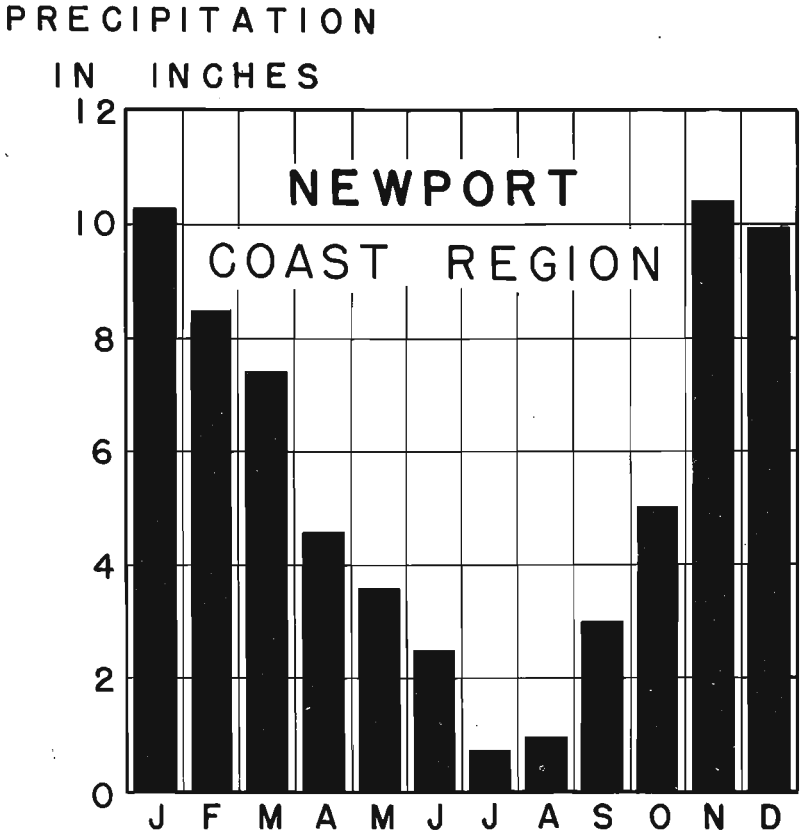


Figure 2. Normal precipitation by months. Newport Weather Station 1887-1940.

## CHARACTERISTICS AND USE OF COAST DAIRY PASTURES

This publication treats only with bottom-land pastures. Hill pastures, which are becoming increasingly important as cut-over and brush lands are seeded to forage plants, are discussed in another publication.* Hill pastures are utilized almost entirely for sheep and beef cattle production, whereas bottom-land pastures in this region are utilized largely for dairy cattle.

These bottom-land pastures, almost within sight of the sea, many of them below the level of high tide, are responsible for a type of farming something like that of Holland and Denmark. The land is in such demand for pasture that it is seldom plowed. Supplemental barn feed is provided to a considerable extent by roots (one of the few places in the United States where this is true);

* Hochmuth, H. R., and Gorton, W. W., *Ranch Organization and Range Land Use in Coos and Curry Counties, Oregon,* Oregon Agricultural Experiment Station Bulletin 381, 1940.

hay is occasionally cut from many of the pastures; and the owners usually buy what concentrates are needed. This is truly grassland farming.

July and August are critical times on many of these farms. At that time butterfat production often takes a slump from which it does not recover. Any system of sustaining feed production during those two months would be a big help.

One answer to this need is supplemental irrigation (Figure 3). Irrigation requires a considerable outlay for equipment, but it greatly increases yield. According to farmers who are using supplemental irrigation, the production is about doubled and the sustained summer production more than compensates for the added expense. No data on irrigated pastures are included in this report because few such pastures were in use during the time that the records upon

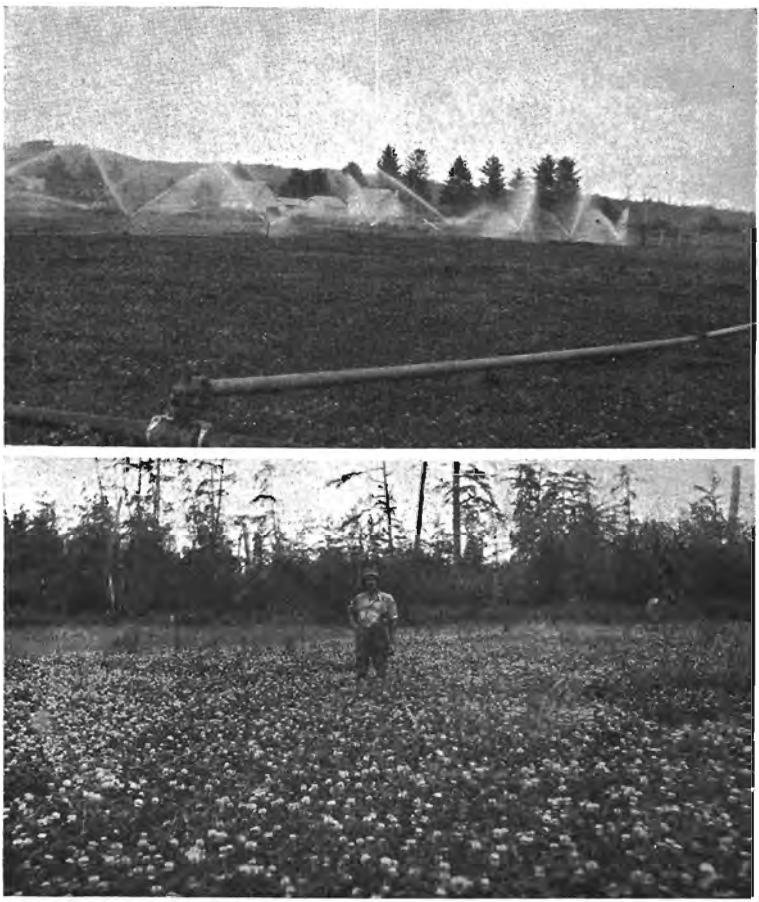

Figure 3. Irrigated Ladino clover makes possible sustained summer production and produces about twice as much forage per acre as unirrigated land.

which this study is based were taken. The rapid increase in the number of irrigated pastures since 1935, however, shows general farmer approval and acceptance of this method of avoiding a summer slump in production.

Other methods of sustaining summer production, and incidentally of increasing pasture yields, are:

1. Use of varieties of grass that will stay green longer. These include the fescues, pasture strains of orchard grass and timothy, and legumes.
2. Delaying the maturity of pasture by cutting the grass when 6 or 8 inches high and putting the clippings into a silo.
3. The clipping of pastures once or twice in the summer to keep them from forming mature tufts around droppings.
4. Harrowing at least once each year to spread droppings.
5. Use of liquid manure, reinforced with phosphate.
6. The plowing and reseeding of weedy, low-producing pastures.

## DESCRIPTION OF PASTURES

The 138 coast-region dairy pasture records that are the basis of this study were obtained from 88 different farms over a two-year period. Records were taken in four coast-region counties. The pastures included have been classified into four pasture types based on the kind of forage plants predominating. The counties included and the number and type of pastures obtained from each are:

| | *Clatsop County* | *Columbia County* | *Coos County* | *Tillamook County* | *Total* |
|---|---|---|---|---|---|
| Mixed grass | 8 | 7 | 14 | 12 | 41 |
| Bent grass | 20 | 3 | 2 | 1 | 26 |
| Clover and rye grass | 10 | 6 | 27 | 13 | 56 |
| Reed canary grass | .... | 1 | 14 | .... | 15 |
| Total | 38 | 17 | 57 | 26 | 138 |

**Mixed grass.** Found throughout the region are pastures composed of mixtures of native and introduced grasses. These pastures may have been seeded to a pasture mixture at one time or another but all contain a wide variety of grass and clover species. Because of the diversity of forage species, all pastures not included in one of the other three types listed, bent grass, clover and rye grass, or Reed canary grass, were included in this mixed-grass classification.

**Bent grass.** Bent grass has proved itself valuable both as a forage and a seed crop. It is an aggressive grower and, once established, tends to perpetuate itself and to supplant other species. Many of the pastures included in this classification had some white clover and rye grass intermixed, but it is probable that as time passes, these stands will tend toward pure bent grass. All but three of the 26 bent-grass pastures included in this study were in the Lower Columbia Area, mostly around Brownsmead and Astoria.

The most common species of bent grass found in these bottom-land pastures was Astoria bent (*Agrostis tenuis*), but Seaside bent (*Agrostis palustris*) and several others were also present. The seed of all varieties finds a ready market and many of the pastures studied had been, and were to be, used for seed production. None so used the year of the study were included even though some pasturage is ordinarily obtained the year that seed is harvested. Some fields included were clipped and hay harvested from them, this hay being entered as a credit to the cost of maintaining them.

The usual incentives to provide a diversity of feed are lacking on bentgrass pastures because most owners intend periodically to harvest seed from them or to rent them to someone who will. The nearer the stand is to pure bent grass, the better the owner likes it. These pastures, therefore, often lack the nitrogen-giving legumes, and nitrate fertilizers nearly always give large returns. If these fields become weedy or unwanted grasses come in, the owners ordinarily plow them and reseed to pure bent grass. Harrowing and clipping are recommended practices.

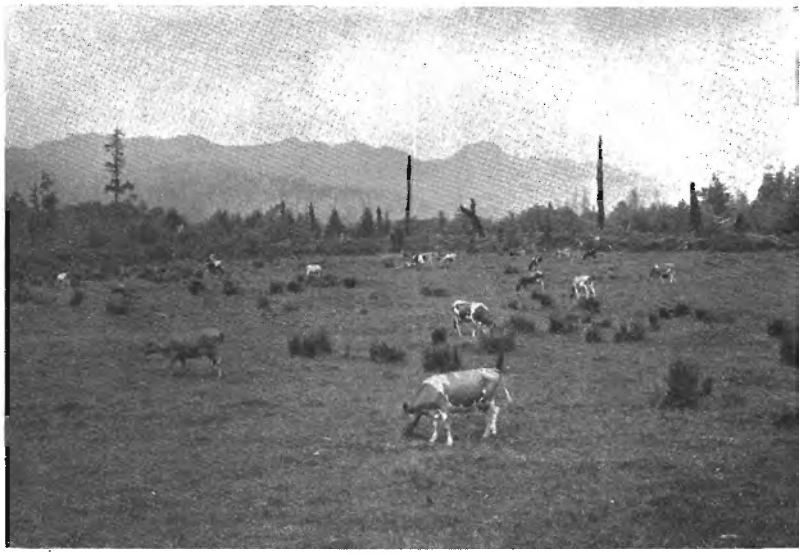

Figure 4. Mixed-grass pasture with tussocks growing in the wet spots and bordered by unimproved stump land.

**Clover and rye grass.** In all parts of the Coast Region are found permanent or semipermanent pastures the cover of which is made up of white or red clover and Italian (common) rye grass. These introduced plants tend to volunteer on soil that is fertile and not too acid in reaction, and persist with remarkable tenacity if soil conditions are suitable and if they are not overgrazed or pastured when too wet. A more common practice than to depend on a volunteer stand, however, is to seed rye grass and white or red clover on a plowed firmed seedbed. If cut for hay occasionally and if reseeding is practiced following cultivation, the stand so established can be maintained almost indefinitely.

Fertilization with phosphates and the application of lime are recommended by the Agricultural Extension Service for all pastures, particularly those where clover is present. The 56 clover-and-rye-grass pastures included in this study, however, received only barnyard manure. Several operators applied liquid manure and reported beneficial results.

Many growers with these pastures reseed frequently—some of them every year. These pastures are usually plowed more frequently than the straight

grass pastures, and the land is occasionally used for roots, grain, peas, potatoes, or other crops. These clover meadows are also cut for hay more often than the poorer grass meadows, and since the weather is often unfit for haying at the proper time, the cutting is often postponed until some of the clover is ripe. This practice results in automatic reseeding of both clover and grass, and al-

Figure 5. Reed canary grass pasture near Coquille, Coos County, Oregon.

Figure 6. Reed canary-grass pasture divided into several fields for rotation grazing.

though the cattle may not relish eating the mature hay, it is fine for the meadows.

In most of these pastures, the use of grasses longer lived than Italian rye grass would probably pay good dividends. When this rye grass is used, even with frequent reseeding, the pasture tends toward a sod composed of other short-lived grasses, such as rat-tail fescue and annual foxtail, and toward the ever-present sweet vernal and velvet grass. Rich deep soil repays expense put on it better than thin poor soil, and these clover type pastures on fertile soil will repay their owners for seed of good grasses.

**Reed canary grass.** Along the course of the Coquille, Coos, and other Oregon coastal rivers a flood condition occurs frequently during the winter. The area thus inundated includes some of the highest producing nonirrigated pasture land in the state—thanks to fertile soil and a grass that "can take it"—Reed canary grass.

Reed canary grass (*Phalaris arundinacea*), a long-lived perennial, was first introduced into this region about 1885. The original seeding, near Fish-trap in Coos County, is still in existence. All but one of the 15 pastures of this type studied were located in Coos County.

The proper management of this pasture type is simple, but rather exacting. Reed canary grass will not permit of overgrazing and it is unpalatable if allowed to grow tall and coarse. To meet these conditions canary-grass pastures are commonly divided into several parts by cross fencing and a pasture rotation system set up. When seed prices are favorable, one or more of these fields may be reserved for seed. Other fields are in turn grazed for a period or so and then clipped with a mower to remove old coarse growth. For these reasons pasture rotation is practiced more universally in this region than in any other region in Oregon.

## GRAZING VALUE OF PASTURES

Most pastures were grazed by two or more classes of livestock, which made it necessary to convert all stock to a comparable unit if yields were to be conveniently stated. In this study, as in most other pasture and range studies, the unit selected was the animal unit (A. U.) which is defined as being one mature cow or the equivalent in other stock. The conversion factors used, which are roughly based on the forage requirements of the different classes of livestock, were one horse or five sheep or goats. Two head of young stock were considered to be equal to one head of mature stock of like kind. An animal unit day of grazing is one day's grazing for an animal unit. The animal unit measurement is not used to indicate grazing capacity but to show animals actually grazed. The data given indicate the actual use of the pasture. No attempt was made to determine whether these pastures were overgrazed or undergrazed.

Dairy cattle were the predominant class of stock on all four pasture types, accounting for from 84 per cent of the total use for mixed-grass pastures, to 94 per cent for canary-grass pastures. Other stock consisted mainly of dairy heifers, dairy bulls, and horses. Few sheep were pastured on these damp bottom-land pastures because of the danger of foot rot and parasites.

Dairymen commonly give their milking cows some feed supplemental to pasture, for cattle are unable to assimilate sufficient grass to provide the nutri-

ents necessary for sustained high production and bodily maintenance.* Those dairymen who followed this practice on the pastures included in this study fed an average of about 3 pounds of grain, 2 pounds of hay, and 8 pounds of succulents such as mangels and turnips per head per day. The amounts fed accounted for about one-fourth of the total feed requirements of the cows on pasture. Feeding rates to milk cows were rather uniform and varied but little by type of pasture although the type of feed used varied considerably depending on the kinds available on the farms. Other classes of livestock were fed only in isolated instances during the pasture season.

**Mixed grass.** Mixed-grass pastures produced 119 animal-unit days of grazing per acre during an 8-month grazing season that extended from the latter part of March to the last of November. There was, of course, considerable variation in production, 12 per cent of them producing over 200 animal-unit days of grazing per acre and 30 per cent producing less than 100. At the average rate of stocking it would require about 2.0 acres to carry 1 animal unit for the season (Table 1).

Table 1. GRAZING VALUE OF DAIRY CATTLE PASTURES.
Coast Region, Oregon, 1934 and 1935

| Pasture types | Pastures | | Length of grazing season | Grazing produced per acre | Pasture land used to carry 1 AU for grazing season | Animal units carried per acre | Proportion of feed from supplemental sources |
|---|---|---|---|---|---|---|---|
| | Number | Average size | | | | | |
| | | *Acres* | *Days* | *AU** | *Acres* | *AU* | *Per cent* |
| Mixed grass | 41 | 51 | 238 | 119 | 2.0 | 0.5 | 20 |
| Bent grass | 26 | 37 | 224 | 138 | 1.6 | .6 | 25 |
| Clover and rye grass | 56 | 32 | 239 | 200 | 1.2 | .8 | 25 |
| Canary grass | 15 | 28 | 209 | 251 | .8 | 1.2 | 22 |

* An animal unit (A.U.) was considered to be one mature cow or horse, 5 sheep, 8 hogs, or 100 poultry. Two head of young stock were considered to be the equivalent of one head of mature stock of like kind.

**Bent grass.** The bent-grass pastures studied were not particularly heavy forage producers, averaging but 138 animal unit days of grazing per acre. The pasture season extended from the latter part of March to the fore part of November, a period of some 7½ months. It would, at the average rate of stocking, require about 1.6 acres of bent grass to carry an animal unit for the season. Dairy cows and heifers utilized most of the feed produced by these pastures but some beef cattle and horses were also found on them.

**Clover and rye grass.** For an 8-month grazing season, April through most of November, these pastures produced an average of 200 animal-unit days of grazing per acre. At this rate of stocking it would require 1.2 acres to carry a cow for the season.

* The recommendations for grain feeding on good pasture are approximately as follows:

Milk testing 3.5 per cent to 4.5 per cent: Feed 1 pound of grain for each 2½ pounds of milk over 16 pounds per day.

Milk testing 4.5 per cent to 5.5 per cent: Feed 1 pound of grain for each 2 pounds of milk over 12 pounds per day.

From *Cost and Efficiency in Dairy Farming in Oregon,* Bulletin 318, Oregon Agricultural Experiment Station. Page 41.

**Reed canary grass.** The grazing season on these pastures extended from about the first of April to the first of November. During this 7-month season, the 15 canary-grass pastures studied produced an average of 251 animal unit days of grazing per acre. At this rate of stocking it required approximately .8 acre to carry a mature cow for the season. Some of these pastures carried the equivalent of two mature cows to the acre, while others carried considerably less than one. Dairy cattle accounted for all except 6 per cent of the total use of these pastures.

## MAINTENANCE COSTS OF PASTURES

Pasture, says the dictionary, is "grass or other plants grown for feeding grazing animals." No harvest labor is involved in thus producing feed, and maintenance labor requirements are low, particularly on permanent stands. The major cost items, therefore, are those involved in the use of the land—taxes, and interest on the investment in land and fences. For all of the pastures studied interest charges accounted for approximately 60 per cent of all costs, taxes for 30 per cent, and other costs for the remaining 10 per cent.

The value of the pasture land was in each case estimated by the operator at the asking price of similar land in the vicinity. The assessed value and taxes on each pasture were obtained from the records of the county assessor. Interest on the estimated value of the land was charged at the arbitrarily selected rate of 5 per cent, and interest and depreciation were charged on all owned fence and equipment used in connection with the pasture. Depreciation was computed on the straight line basis over the estimated total life of the object and interest was charged at 5 per cent on its present value. The cost of establishing a stand was charged off over the productive life of the stand.

**Mixed grass.** The net average annual cost of maintaining mixed-grass pastures was $8.76 per acre, which amounts to 7.4 cents per day of grazing for the 119 animal-unit days produced per acre. At this rate it would cost about $17.50 per cow for pasture for the 8-month pasture season.

Taxes amounted to $2 per acre and interest on the estimated value of the land to $5.41 per acre (Table 2). The average value of the land, as estimated by the operators, was $108 per acre and the average assessed value was $50, or 46 per cent of the operators' estimate of the true value. Costs other than taxes and interest charges were for fertilizer, seed and seeding, weed control, fence repairs, and miscellaneous jobs such as slashing and burning brush, cleaning drainage ditches, etc.

The direct labor requirements amounted to 2½ hours per acre. For the average pasture of 51 acres this amounts to about 12¾ days of man labor per year. Much of this labor was expended in the winter months fixing fence, clearing fields of brush, and cleaning drainage ditches.

Cash or out-of-pocket costs were low, accounting for about a quarter of all costs. Cash outlay was largely for taxes with minor expenditures for hired labor, repairs, seed, and drainage assessments.

**Bent grass.** A day of grazing for a dairy cow or its equivalent of other livestock was produced by bent-grass pastures at a cost of 8 cents. With a 7½-month pasture season this would amount to a cost of approximately $18 per cow per year for pasturage. Of the total gross cost of $11.20 per acre 56 per cent was for interest on the value of the land, 32 per cent for land tax, and 12 per cent for maintenance operations (Table 2).

The cooperators estimated that the land on which these pastures were located was worth about $126 per acre. The average assessed value, as determined by the county tax assessor, was $66 per acre or 52 per cent of the estimated true value.

Cash or out-of-pocket costs accounted for $4.22 per acre or 38 per cent of the total gross cost. The major cash cost was for taxes. Other cash costs were for hired labor, drainage assessments, fence repairs, and seed.

The maintenance of these permanent pastures requires but little direct labor. The bent-grass pastures included in this study were maintained with a labor outlay of but 1.3 hours per acre of which 1.0 was for fence repairing, .2 for weeding, and .1 for miscellaneous odd jobs.

**Clover and rye grass.** An animal-unit day of grazing was produced by this pasture type at a cost of 7 cents which amounted to a cost of $17 per animal unit for pasturage for the 239-day pasture season. The total gross cost per acre was $14.73, from which was subtracted a credit of $0.68, for hay cut from the pasture, to arrive at a net cost of $14.05 per acre (Table 2).

Of the total cost 64 per cent was for interest on the value of the land, and 24 per cent was for taxes. The remaining 12 per cent of the cost was expended for maintenance costs such as fertilizing, cultivating, weeding, and fence maintenance.

The pasture land was valued at from $70 to $400 per acre and averaged $188.60. The assessed value averaged $85 or 45 per cent of the estimated true value per acre. Some tracts were assessed for as much as $140 per acre and others for as low as $10. The lowest valuations were in Columbia County and the highest in Coos County. No definite relationship between land value and yield could be ascertained from the data at hand, nor was there any strong correlation between the values estimated by the operator and those set by the tax assessor.

Cash costs accounted for $3.91 per acre or 27 per cent of the total gross cost. Taxes were the largest out-of-pocket expense, followed by hired labor, fence repairs, drainage fees, and miscellaneous items. An average of 2.7 hours of labor was expended per acre; 1 hour for cultivating and weeding, .8 hour for fixing fence, .6 hour for cleaning drainage ditches and miscellaneous tasks, and .3 hour for hauling and spreading manure.

**Reed canary grass.** The average cost per animal unit day of grazing produced by this pasture type was 5.7 cents, which amounts to about $12 per cow per year for the 7-month grazing season. Of the $14.29 cost per acre, 57 per cent was for interest on the land, 29 per cent for taxes, 7 per cent for drainage assessments, and 7 per cent for fence repair, weeding, and other maintenance operations (Table 2).

The average value of the land, as estimated by the cooperating farmers, was $160.60 per acre. The average assessed value, as determined by the tax assessor, was $128.65 or 80 per cent of the estimated true value. This is the highest proportionate assessment of any pasture type studied.

Direct labor was expended mainly for fence upkeep, averaging .9 hour per acre. Digging weeds such as sedges, locally referred to as tussocks, and miscellaneous maintenance operations including clipping of old growth with a mowing machine, required another .4 man hour and .5 horse hour per acre.

Cash or out-of-pocket costs amounted to $5.37 per acre or 38 per cent of the total cost of $14.29. Taxes were the largest of these cash costs, followed by drainage assessments, fence repairs, hired labor, and seed.

Table 2. COST OF MAINTAINING DAIRY CATTLE PASTURES. Coast Region, Oregon, 1934 and 1935

| Item | Mixed grass | Bent grass | Clover and rye grass | Canary grass |
|---|---|---|---|---|
| Number of pastures studied | 41 | 26 | 56 | 15 |
| Average size, acres | 51 | 37 | 32 | 28 |
| Value of land per acre | $108.20 | $126.20 | $188.60 | $160.60 |
| Cost per acre: | | | | |
| Fertilizing | $0.59 | $..... | $ 0.40 | $..... |
| Cultivating | .13 | .03 | .05 | ..... |
| Weeding | .12 | .57 | .25 | 0.11 |
| Reseeding | .08 | .04 | .06 | .03 |
| Fence upkeep | .38 | .42 | .70 | 1.04 |
| Depreciation of stand | .06 | ..... | .18 | ..... |
| Drainage assessments | .04 | .14 | .07 | .94 |
| Miscellaneous | .17 | .10 | .13 | .03 |
| Taxes | 2.00 | 3.59 | 3.46 | 4.11 |
| Interest on land (at 5 per cent) | 5.41 | 6.31 | 9.43 | 8.03 |
| Total cost per acre | $8.98 | $11.20 | $14.73 | $14.29 |
| Credit for hay or seed | .22 | .14 | .68 | ..... |
| Total net cost per acre | $8.76 | $11.06 | $14.05 | $14.29 |
| Animal unit (cow) days of grazing produced per acre | 119 | 138 | 200 | 251 |
| Cost per day of grazing | 7.4¢ | 8.0¢ | 7.0¢ | 5.7¢ |

# Appendix

## PASTURE YIELD IN TERMS OF FEED EQUIVALENT

There is often a desire on the part of farmers, county agricultural agents, and others interested in pasture production to state pasture yields in terms of some tangible unit such as tons of hay. This procedure is fraught with danger from a technical standpoint because it attempts to state in definite terms that which is indefinite and measurable only through the use of standards set up under conditions other than those present on farm pastures. Full recognition is given to these difficulties but it is believed that the value of the data so obtained outweighs objections, hence pasture yield has been computed in terms of digestible nutrients and converted to the feed equivalent of alfalfa hay:

| *Pasture* | *Total digestible nutrients produced per acre* | *Feed equivalent in terms of alfalfa hay per acre* | *Cost per acre* | *Cost per ton of feed equivalent to a ton of alfalfa hay* |
|---|---|---|---|---|
| | *Pounds* | *Tons* | | |
| Mixed grass | 1,488 | 1.5 | $ 8.76 | $5.84 |
| Bent grass | 1,424 | 1.4 | 11.06 | 7.90 |
| Clover and rye grass | 2,300 | 2.3 | 14.05 | 6.11 |
| Reed canary grass | 3,112 | 3.1 | 14.29 | 4.60 |

The method employed to arrive at this measure of pasture yield was, briefly:

1. The feed requirements of each class of livestock on each pasture were computed based on the data at hand. In the case of dairy cows average weight, milk test, and production were available and for most other animals, weight was known. Feed requirements in terms of total digestible nutrients were taken from Morrison's "Feeds and Feeding."* The average daily feed requirements of the different classes of livestock included in this study, expressed in pounds of digestible nutrients were

| | | | |
|---|---|---|---|
| Dairy cows | 15.22 | Sheep | 2.25 |
| Young stock | 7.08 | Horses | 15.60 |
| Other cattle | 12.00 | | |

2. From the total feed required, as expressed in terms of digestible nutrients, was subtracted the nutrients furnished by supplemental feeding. The digestible nutrient content of the different classes of feed was considered to be: Hay 50 per cent, concentrates 70 per cent, and succulents 15 per cent. For the study as a whole, 75 per cent of the total feed requirements of milk cows was provided by pasture while the stock was on pasture. Other classes of stock received nearly all their feed requirements from pasture during the pasture season.
3. The net production of digestible nutrients was converted to terms of alfalfa hay on the basis of 1 pound of digestible nutrients being the equivalent of 2 pounds of alfalfa hay. The production of pastures in terms of these units and the cost per unit was as shown previously. To

* Morrison, F. B., "Feeds and Feeding," 20th edition, Morrison Publishing Company, Ithaca, New York.

illustrate the method used, a 1,000-pound cow giving 25 pounds of 4.5 per cent milk requires about 16.6 pounds of digestible nutrients per day. If 5 pounds of hay and 2 pounds of grain were fed per day, a total of about 4 pounds of nutrients would be supplied from this source, leaving 12.6 pounds to be furnished by the pasture. If an acre of pasture produced 100 days of grazing for this cow, the production in terms of digestible nutrients would be 1,260 pounds. This is the feed equivalent of 2,520 pounds, or approximately 1.3 tons, of alfalfa hay.

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